

### REMARKS

The Examiner is thanked for the performance of a thorough search.

#### AMENDMENTS TO THE SPECIFICATION

In the specification, paragraph on page 6, starting at line 6, has been amended to provide a filing date and correct the attorney docket number for the referenced application.

#### STATUS OF CLAIMS

Claims 17, 27, and 31 have been cancelled.

Claims 1, 16, 18-19, 23, 26, 28-30, 32 and 36 have been amended.

Claims 1-16, 18-26, 28-30, and 32-39 are currently pending in the application.

#### REJECTIONS BASED ON 35 U.S.C. § 112, FIRST PARAGRAPH

Claims 27-30 have been rejected under 35 U.S.C. § 112, first paragraph as allegedly failing to comply with the enablement requirement.

Claim 27 has been canceled. Claims 28-30 have been amended. Amended Claims 28-30 are enabled by the disclosure because they recite that the M-trie data structure does not reside in a data packet, but is rather stored in the router. For this reason, the rejection of Claims 28-30 on the basis of 35 U.S.C. § 112, first paragraph is overcome and should be withdrawn.

#### REJECTIONS BASED ON THE PRIOR ART

Claims 1-3, 5, 6, 16-19 and 28-32 have been rejected under 35 U.S.C. § 102(e) as allegedly anticipated by *DURET*. Claims 4, 7, 20, and 33 have been rejected under 35 U.S.C. § 103(a) as allegedly unpatentable over *DURET*. Claims 8, 9, 21, 22, 34, and 35 have been rejected under 35 U.S.C. § 103(a) as allegedly unpatentable over *DURET* in view

of *CHIU*. Claims 10-13, 15, 23, 24, 26, 36, 37 and 39 have been rejected under 35 U.S.C. § 103(a) as allegedly unpatentable over *DURET* in view of *ONISHI*. Claims 14, 25 and 38 have been rejected under 35 U.S.C. § 103(a) as allegedly unpatentable over *DURET* in view of *ONISHI*, and further in view of *CHIU*. The rejections are respectfully traversed.

A. REJECTION OF CLAIM 1 UNDER 35 U.S.C. § 102(E)

As amended, Claim 1 features an expanded M-trie data structure that is organized as a multi-level tree. Support for this amendment is found in FIG. 2 of the Application which depicts an M-trie data structure organized as a tree with the root node at one level, and the inferior nodes at another level.

In contrast, *DURET* discloses a TRIE data structure that is a flat table. Specifically, FIG. 1 of the *DURET* patent depicts a TRIE memory that has rows and columns and is not organized by multiple levels of a root, leaves, and branches. Moreover, in col. 1, lines 50-54, the *DURET* patent expressly states that

[b]y using the **row index** for the register R and the **column index** for the value V of the slices and by taking the register  $R_0=0$  as the gate, the **table** of the TRIE memory will appear as illustrated in FIG. 1... (Emphasis added.)

The above passage unmistakably discloses that the TRIE memory in *DURET* is organized as a table with rows and columns.

The paragraph in *DURET* in col. 4, lines 4-9, which the Office Action cites as supporting the disclosure of a M-trie data structure, further confirms that the TRIE memory in *DURET* is organized as a table:

[t]he router 10 has a forwarding module 12 which forwards the packets received in accordance with instructions, referred to hereafter as <<forwarding

references>> or <<final status>>, produced by an analysis module 13 from an  
**memory organized as a TRIE memory table.** (Emphasis added.)

Thus, while *DURET* does disclose an M-trie memory, it fails to disclose, teach, or suggest that this M-trie memory can be organized as anything but a table with rows and columns, let alone as a multi-level tree with roots, leaves, and branches.

The Office Action states that the gate cells, the elementary cells, and the final status cells described in *DURET* correspond respectively to the root nodes, the inferior nodes, and the terminal nodes recited in Claim 1 (Office Action, page 3, paragraph 9). A cell in a table data structure cannot be properly considered an equivalent of a node in a multi-level tree data structure because that would obviate the substantial differences that exist between the structure and use of a table data structure and a multi-level tree data structure.

Furthermore, one of ordinary skill in the art would not consider that the use for routing of a memory data structure organized as a multi-level tree is obvious in light of a memory data structure organized as a table. The data processing mechanisms used for traversing a memory data structure organized as a table (e.g. by specifying a row index and a column index, see *DURET*, col. 1, lines 50-55) are substantially different from mechanisms typically used for traversing a memory structure organized as a multi-level tree (e.g. “The path from the root to the leaf is described by a key”, Application, page 9, line 14-15). When these differences between the traversing mechanisms are considered in the context of routing, where the speed with which the particular memory data structure is traversed generally determines the throughput of the router, one of ordinary skill in the art would not have considered a multi-level tree memory structure as obvious in light of a memory structure that is organized as a flat table.

Furthermore, the Office Action does not assert, and the Applicant does not consider, that *CHIU* or *ONISHI* disclose, teach, suggest, or in any way render obvious an M-trie data structure “**organized as a multi-level tree.**” Thus, because *DURET*, taken alone or in combination with *CHIU* or *ONISHI*, fails to disclose, teach, suggest, or in any way render obvious the element in Claim 1 requiring that the M-trie data structure is “**organized as a multi-level tree**”, Claim 1 is allowable over the art of record and is in condition for allowance.

B. REJECTIONS OF CLAIMS 16, 28, 29, AND 30 UNDER 35 U.S.C. § 102(E)

Independent Claims 16, 28, 29, and 30 contain features that are similar to those described above with respect to Claim 1, including an M-trie data structure that is “**organized as a multi-level tree**”. Therefore, for at least the reasons stated above for Claim 1, Claims 16, 28, 29, and 30 are allowable over the art of record and are in condition for allowance.

C. REJECTIONS OF CLAIMS 11-13, 24 AND 37 UNDER 35 U.S.C. § 103(A)

Claims 11-13, 24, and 37 depend from Claim 1, 16, and 30, respectively, and thus include each and every feature of their associated independent claims. Therefore, Claims 11-13, 24, and 37 are allowable for the reasons given above with respect to Claims 1, 16, and 30.

Furthermore, Claims 11-13, 24, and 37 recite that the opcodes for demultiplexing include instructions to demultiplex “**into branches of said expanded M-trie data structure**” based on the contents of one or more bytes in a packet. This feature is not disclosed, taught or suggested in the cited prior art because *DURET* does not disclose, either alone or in combination with *ONISHI* and *CHAU*, that the M-trie memory can be organized in a multi-level tree with roots, leaves, and branches.

Regarding Claims 11-13, 24, and 37, the Office Action asserts that *DURET* discloses that the M-trie table includes nodes for demultiplexing, “where the instructions in the opcode have the trie follow different paths depending on the contents of the header... .” (Office Action, page 8.) The Office Action states that the following paragraph from *DURET* supports this assertion:

When a packet arrives, its header is stored in a buffer memory and a first portion of the stored header is analyzed. Each analysis of a header portion of a packet produces either the forwarding reference associated with the packet or an intermediate reference containing a first code, which makes it possible to locate at an arbitrary location of the buffer memory a subsequent portion to be analyzed, and a second code which makes it possible to locate an arbitrary location of the TRIE memory a gate register from which said subsequent portion should be analyzed. Having analyzed the first portion of a stored header, the subsequent portions thereof are analyzed in accordance with the first and second codes contained in the intermediate references produced in succession until the forwarding reference is obtained.

Consequently, the contents of the TRIE memory no longer represent only the references associated with the packet headers as such. The also incorporate a programme consisting of the string of elementary analyses to be performed, depending on the different configurations taken into account by the memory. These strings are entirely programmable insofar as the user can define, arbitrarily and at each step of the process, which portion of the header must be examined and from which register of the TRIE memory.

(Col. 3, lines 10-34.) Even assuming that this paragraph discloses an M-trie memory that includes instructions for demultiplexing, nothing in this paragraph teaches or suggests that demultiplexing can be performed by following different branches of the M-trie memory. As mentioned above, *DURET* discloses that the M-trie memory can only be organized as a flat table with rows and columns, and it is impossible to discern what portion of a table can possibly be considered as a branch of that table.

In contrast, Claims 11-13, 24, and 37 expressly recite that demultiplexing is to be performed by following the branches of an expanded M-trie data structure organized as a multi-level tree. Thus, since *DURET* does not disclose, teach, or suggest, either alone or in

combination with *ONISHI* and *CHAU*, that demultiplexing is to be performed by following the branches of an M-trie multi-level tree, Claims 11-13, 24, and 37 are allowable over the art of record and are in condition for allowance.

D. REJECTIONS OF CLAIMS 2-10, 14-15, 18-23, 25-26, 32-36, AND 38-39 UNDER  
35 U.S.C. § 103(A)

Claims 2-10, 14-15, 18-23, 25-26, 32-36, and 38-39 are dependent upon Claims 1, 16, and 30, respectively, and thus include each and every feature of the corresponding independent claims. Therefore, Claims 32-10, 14-15, 18-23, 25-26, 32-36, and 38-39 are allowable for the reasons given above with respect to Claims 1, 16, and 30.

RESPONSE TO CLAIM OBJECTIONS

Claim 26 has been objected to because of an informality. In this amendment, Claim 26 has been rewritten to remove “4” from the language of the claim. The Applicant respectfully submits that Claim 26 as amended addresses the objection of the Office Action. Therefore, the Applicant respectfully submits that Claim 26 is allowable over the art of record and is in condition for allowance.

Claim 31 has been objected to because of it allegedly did not conform to the meaning of the claim from which it depended. In this amendment, Claim 31 has been canceled to focus the application and not in response to the objection.

CONCLUSION

The Applicant believes that all issues raised in the Office Action have been addressed. Further, for the reasons set forth above, it is respectfully submitted that all of the pending

claims are now in condition for allowance. Therefore, the issuance of a formal Notice of Allowance is believed next in order, and that action is most earnestly solicited.

The Examiner is respectfully requested to contact the undersigned by telephone if it is believed that such contact would further the examination of the present application.

To the extent necessary to make this reply timely filed, the Applicant petitions for an extension of time under 37 C.F.R. § 1.136.

If any applicable fee is missing or insufficient, throughout the pendency of this application, the Commissioner is hereby authorized to pay any applicable fees and to credit any overpayments to our Deposit Account No. 50-1302.

Respectfully submitted,

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